SEQUENCE LISTING

<110> Bron, Sierd
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Mueller, Joerg P.
Van Dijl, Jan M.

<120> Twin-Arginine Translocation in Bacillus

<130> GC634-2

<140> US 09/954,737
<141> 2001-09-17

<150> US 60/233,610
<151> 2000-09-18

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Val Leu Leu Phe Gly Thr Lys Lys Leu Gly Ser Ile Gly Ser Asp Leu
20 25 30
Gly Ala Ser Ile Lys Gly Phe Lys Lys Ala Met Ser Asp Asp Glu Pro
35 40 45
Lys Gln Asp Lys Thr Ser Gln Asp Ala Asp Phe Thr Ala Lys Thr Ile
50 55 60
Ala Asp Lys Gln Ala Asp Thr Asn Gln Glu Gln Ala Lys Thr Glu Asp
65 70 75 80
Ala Lys Arg His Asp Lys Glu Gln Val
85

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<211> 67
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<213> Escherichia coli

<400> 2
Met Gly Glu Ile Ser Ile Thr Lys Leu Leu Val Val Ala Ala Leu Val
1 5 10 15
Val Leu Leu Phe Gly Thr Lys Lys Leu Arg Thr Leu Gly Gly Asp Leu
20 25 30
Gly Ala Ala Ile Lys Gly Phe Lys Lys Ala Met Asn Asp Asp Asp Ala
35 40 45
Ala Ala Lys Lys Gly Ala Asp Val Asp Leu Gln Ala Glu Lys Leu Ser
50 55 60
His Lys Glu

65

<210> 3
<211> 57
<212> PRT
<213> Bacillus subtilis

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Met Pro Ile Gly Pro Gly Ser Leu Ala Val Ile Ala Ile Val Ala Leu
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            20   25   30
Asp Thr Leu Arg Glu Phe Lys Asn Ala Thr Lys Gly Leu Thr Ser Asp
        35   40   45
Glu Glu Glu Lys Lys Lys Glu Asp Gln
    50   55

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<211> 70
<212> PRT
<213> Bacillus subtilis

<400> 4
Met Phe Ser Asn Ile Gly Ile Pro Gly Leu Ile Leu Ile Phe Val Ile
 1   5   10   15
Ala Ile Ile Ile Phe Gly Pro Ser Lys Leu Pro Glu Ile Gly Arg Ala
            20   25   30
Ala Lys Arg Thr Leu Leu Glu Phe Lys Ser Ala Thr Lys Ser Leu Val
        35   40   45
Ser Gly Asp Glu Lys Glu Glu Lys Ser Ala Glu Leu Thr Ala Val Lys
    50   55   60
Gln Asp Lys Asn Ala Gly
65   70

<210> 5
<211> 62
<212> PRT
<213> Bacillus subtilis

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Met Glu Leu Ser Phe Thr Lys Ile Leu Val Ile Leu Phe Val Gly Phe
 1   5   10   15
Leu Val Phe Gly Pro Asp Lys Leu Pro Ala Leu Gly Arg Ala Ala Gly
            20   25   30
Lys Ala Leu Ser Glu Phe Lys Gln Ala Thr Ser Gly Leu Thr Gln Asp
        35   40   45
Ile Arg Lys Asn Asp Ser Glu Asn Lys Glu Asp Lys Gln Met
    50   55   60

<210> 6
<211> 171
<212> PRT
<213> Escherichia coli

<400> 6
Met Phe Asp Ile Gly Phe Ser Glu Leu Leu Leu Val Phe Ile Ile Gly
 1   5   10   15

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Leu Val Val Leu Gly Pro Gln Arg Leu Pro Val Ala Val Lys Thr Val
            20                  25                  30
Ala Gly Trp Ile Arg Ala Leu Arg Ser Leu Ala Thr Thr Val Gln Asn
        35                  40                  45
Glu Leu Thr Gln Glu Leu Lys Leu Gln Glu Phe Gln Asp Ser Leu Lys
    50                  55                  60
Lys Val Glu Lys Ala Ser Leu Thr Asn Leu Thr Pro Glu Leu Lys Ala
65                  70                  75                  80
Ser Met Asp Glu Leu Arg Gln Ala Ala Glu Ser Met Lys Arg Ser Tyr
                85                  90                  95
Val Ala Asn Asp Pro Glu Lys Ala Ser Asp Glu Ala His Thr Ile His
            100                 105                 110
Asn Pro Val Val Lys Asp Asn Glu Ala Ala His Glu Gly Val Thr Pro
        115                 120                 125
Ala Ala Ala Gln Thr Gln Ala Ser Ser Pro Glu Gln Lys Pro Glu Thr
    130                 135                 140
Thr Pro Glu Pro Val Val Lys Pro Ala Ala Asp Ala Glu Pro Lys Thr
145                 150                 155                 160
Ala Ala Pro Ser Pro Ser Ser Ser Asp Lys Pro
                165                 170
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<211> 258
<212> PRT
<213> Escherichia coli

<400> 7

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Met Ser Val Glu Asp Thr Gln Pro Leu Ile Thr His Leu Ile Glu Leu
 1               5                  10                  15
Arg Lys Arg Leu Leu Asn Cys Ile Ile Ala Val Ile Val Ile Phe Leu
            20                  25                  30
Cys Leu Val Tyr Phe Ala Asn Asp Ile Tyr His Leu Val Ser Ala Pro
        35                  40                  45
Leu Ile Lys Gln Leu Pro Gln Gly Ser Thr Met Ile Ala Thr Asp Val
    50                  55                  60
Ala Ser Pro Phe Phe Thr Pro Ile Lys Leu Thr Phe Met Val Ser Leu
65                  70                  75                  80
Ile Leu Ser Ala Pro Val Ile Leu Tyr Gln Val Trp Ala Phe Ile Ala
                85                  90                  95
Pro Ala Leu Tyr Lys His Glu Arg Arg Leu Val Val Pro Leu Leu Val
            100                 105                 110
Ser Ser Ser Leu Leu Phe Tyr Ile Gly Met Ala Phe Ala Tyr Phe Val
        115                 120                 125
Val Phe Pro Leu Ala Phe Gly Phe Leu Ala Asn Thr Ala Pro Glu Gly
    130                 135                 140
Val Gln Val Ser Thr Asp Ile Ala Ser Tyr Leu Ser Phe Val Met Ala
145                 150                 155                 160
Leu Phe Met Ala Phe Gly Val Ser Phe Glu Val Pro Val Ala Ile Val
                165                 170                 175
Leu Leu Cys Trp Met Gly Ile Thr Ser Pro Glu Asp Leu Arg Lys Lys
            180                 185                 190
Arg Pro Tyr Val Leu Val Gly Ala Phe Val Val Gly Met Leu Leu Thr
        195                 200                 205
Pro Pro Asp Val Phe Ser Gln Thr Leu Leu Ala Ile Pro Met Tyr Cys
    210                 215                 220
Leu Phe Glu Ile Gly Val Phe Phe Ser Arg Phe Tyr Val Gly Lys Gly
225                 230                 235                 240
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Arg Asn Arg Glu Glu Glu Asn Asp Ala Glu Ala Glu Ser Glu Lys Thr
                245                 250                 255
Glu Glu
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<210> 8
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<212> PRT
<213> Bacillus subtilis

<400> 8

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Met Thr Arg Met Lys Val Asn Gln Met Ser Leu Leu Glu His Ile Ala
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Glu Leu Arg Lys Arg Leu Leu Ile Val Ala Leu Ala Phe Val Val Phe
            20                  25                  30
Phe Ile Ala Gly Phe Phe Leu Ala Lys Pro Ile Ile Val Tyr Leu Gln
        35                  40                  45
Glu Thr Asp Glu Ala Lys Gln Leu Thr Leu Asn Ala Phe Asn Leu Thr
    50                  55                  60
Asp Pro Leu Tyr Val Phe Met Gln Phe Ala Phe Ile Ile Gly Ile Val
65                  70                  75                  80
Leu Thr Ser Pro Val Ile Leu Tyr Gln Leu Trp Ala Phe Val Ser Pro
                85                  90                  95
Gly Leu Tyr Glu Lys Glu Arg Lys Val Thr Leu Ser Tyr Ile Pro Val
            100                 105                 110
Ser Ile Leu Leu Phe Leu Ala Gly Leu Ser Phe Ser Tyr Tyr Ile Leu
        115                 120                 125
Phe Pro Phe Val Val Asp Phe Met Lys Arg Ile Ser Gln Asp Leu Asn
    130                 135                 140
Val Asn Gln Val Ile Gly Ile Asn Glu Tyr Phe His Phe Leu Leu Gln
145                 150                 155                 160
Leu Thr Ile Pro Phe Gly Leu Leu Phe Gln Met Pro Val Ile Leu Met
                165                 170                 175
Phe Leu Thr Arg Leu Gly Ile Val Thr Pro Met Phe Leu Ala Lys Ile
            180                 185                 190
Arg Lys Tyr Ala Tyr Phe Thr Leu Leu Val Ile Ala Ala Leu Ile Thr
        195                 200                 205
Pro Pro Glu Leu Leu Ser His Met Met Val Thr Val Pro Leu Leu Ile
    210                 215                 220
Leu Tyr Glu Ile Ser Ile Leu Ile Ser Lys Ala Ala Tyr Arg Lys Ala
225                 230                 235                 240
Gln Lys Ser Ser Ala Ala Asp Arg Asp Val Ser Ser Gly Gln
                245                 250
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<210> 9
<211> 245
<212> PRT
<213> Bacillus subtilis

<400> 9

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Met Asp Lys Lys Glu Thr His Leu Ile Gly His Leu Glu Glu Leu Arg
 1               5                  10                  15
Arg Arg Ile Ile Val Thr Leu Ala Ala Phe Phe Leu Phe Leu Ile Thr
            20                  25                  30
Ala Phe Leu Phe Val Gln Asp Ile Tyr Asp Trp Leu Ile Arg Asp Leu
        35                  40                  45
Asp Gly Lys Leu Ala Val Leu Gly Pro Ser Glu Ile Leu Trp Val Tyr
```

```
    50                  55                  60
Met Met Leu Ser Gly Ile Cys Ala Ile Ala Ala Ser Ile Pro Val Ala
65                  70                  75                  80
Ala Tyr Gln Leu Trp Arg Phe Val Ala Pro Ala Leu Thr Lys Thr Glu
                85                  90                  95
Arg Lys Val Thr Ile Met Tyr Ile Met Tyr Ile Pro Gly Leu Phe Ala
            100                 105                 110
Leu Phe Leu Ala Gly Ile Ser Phe Gly Tyr Phe Val Leu Phe Pro Ile
        115                 120                 125
Val Leu Ser Phe Leu Thr His Leu Ser Ser Gly His Phe Glu Thr Met
    130                 135                 140
Phe Thr Ala Asp Arg Tyr Phe Arg Phe Met Val Asn Leu Ser Leu Pro
145                 150                 155                 160
Phe Gly Phe Leu Phe Glu Met Pro Leu Val Val Met Phe Leu Thr Arg
                165                 170                 175
Leu Gly Ile Leu Asn Pro Tyr Arg Leu Ala Lys Ala Arg Lys Leu Ser
            180                 185                 190
Tyr Phe Leu Leu Ile Val Val Ser Ile Leu Ile Thr Pro Pro Asp Phe
        195                 200                 205
Ile Ser Asp Phe Leu Val Met Ile Pro Leu Leu Val Leu Phe Glu Val
    210                 215                 220
Ser Val Thr Leu Ser Ala Phe Val Tyr Lys Lys Arg Met Arg Glu Glu
225                 230                 235                 240
Thr Ala Ala Ala Ala
                245
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<211> 63
<212> PRT
<213> Bacillus alcalophilus

<400> 10

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Met Gly Gly Leu Ser Val Gly Ser Val Val Leu Ile Ala Leu Val Ala
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Leu Leu Ile Phe Gly Pro Lys Lys Leu Pro Glu Leu Gly Lys Ala Ala
            20                  25                  30
Gly Ser Thr Leu Arg Glu Phe Lys Asn Ala Thr Lys Gly Leu Ala Asp
        35                  40                  45
Asp Asp Asp Asp Thr Lys Ser Thr Asn Val Gln Lys Glu Lys Ala
    50                  55                  60
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<212> PRT
<213> Bacillus alcalophilus

<400> 11

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Met Thr Met Met Thr Pro Asn Gln Gln Thr Ser Lys Lys Lys Lys Arg
 1               5                  10                  15
Lys Gly Arg Lys Gly Arg Val Pro Met Gln Asp Met Ser Ile Met Asp
            20                  25                  30
His Ala Glu Glu Leu Arg Arg Arg Ile Phe Val Val Leu Ala Phe Phe
        35                  40                  45
Ile Val Ala Leu Ile Gly Gly Phe Phe Leu Ala Val Pro Val Ile Thr
    50                  55                  60
Phe Leu Gln Asn Ser Pro Gln Ala Ala Asp Met Pro Phe Asn Ala Phe
65                  70                  75                  80
```

```
Arg Leu Thr Asp Pro Leu Arg Val Tyr Met Asn Phe Ala Val Ile Thr
                85                  90                  95
Ala Leu Val Leu Ile Ile Pro Val Ile Leu Tyr Gln Leu Trp Ala Phe
            100                 105                 110
Val Ser Pro Gly Leu Lys Glu Asn Glu Gln Lys Ala Thr Leu Ala Tyr
        115                 120                 125
Ile Pro Ile Ala Phe Leu Leu Phe Leu Ala Gly Ile Ala Phe Ser Tyr
    130                 135                 140
Phe Ile Leu Leu Pro Phe Val Ile Ser Phe Met Gly Gln Met Ala Asp
145                 150                 155                 160
Arg Leu Glu Ile Asn Glu Met Tyr Gly Ile Asn Glu Tyr Phe Ser Phe
                165                 170                 175
Leu Phe Gln Leu Thr Ile Pro Phe Gly Leu Leu Phe Gln Leu Pro Val
            180                 185                 190
Val Val Met Phe Leu Thr Arg Leu Gly Val Val Thr Pro Thr Phe Leu
        195                 200                 205
Arg Lys Ile Arg Lys Tyr Ala Tyr Phe Ala Leu Leu Val Ile Ala Gly
    210                 215                 220
Ile Ile Thr Pro Pro Glu Leu Thr Ser His Leu Phe Val Thr Val Pro
225                 230                 235                 240
Met Leu Ile Leu Tyr Glu Ile Ser Ile Thr Ile Ser Ala Ile Thr Tyr
                245                 250                 255
Arg Lys Tyr His Gly Thr Thr Asp His Asn Gly Gln Glu Ser Ala Lys
            260                 265                 270
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<220>
<223> primer

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<210> 14
<211> 39
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<213> Artificial Sequence

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<223> primer

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<210> 15
<211> 25
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<220>
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<400> 16
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<210> 17
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<210> 22
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<210> 23
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atagaattca aaaaggaaga gtatg 25

<210> 24
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ctggggatcc aaaaacagga aggc 24

<210> 25
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gagaaggtcg acgcagcatt tacttcaaag gcccc 35

<210> 26
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